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ABSTRACT

The Bidwell Training Center, Inc., in Pittsburgh, Pennsylvania, evaluated the effectiveness of IBM's Principle of the Alphabet Literacy System (PALS), an interactive instructional program to teach adolescents and adults writing and reading skills. Bidwell's goal was to use PALS to teach large numbers of adults who read below the fifth-grade level. Every effort was made to implement the PALS program strictly as outlined by IBM. However, the center conducted 15-week cycles rather than the recommended 20-week cycles, with open entry. The computer lab, which cost approximately $50,000, was sectioned into three major work stations. Students used INfo-window stations, a double-sided instructional videodisc, a work journal, word processing stations, and a typing program. Students who tested at grades 2-4 level at the beginning of the program fared best, advancing an average of 1.7 grade levels by the end of the program. Students below this level were little helped, but would have been screened out by IBM. Bidwell concluded that PALS can be an effective tool in teaching adults to read and write, but suggested both improvements to the program and ways to incorporate PALS into a holistic instructional approach using phonemics, linguistics, language expression, structural analysis, and multilevel comprehension techniques. (KC)

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BIDWELL PRE-COMPUTER LITERACY PROGRAM

AN EVALUATION OF IBM'S PRINCIPLE OF THE ALPHABET LITERACY SYSTEM (PALS)

Bidwell Training Center Inc.
1815 Metropolitan Street
Pittsburgh, PA 15233

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September 1988

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ABSTRACT

This paper presents an overview and evaluation of the effectiveness of IBM's Principle of the Alphabet LIteracy System (PALS), an interactive instructional program to teach adolescents and adults writing and reading skills. Bidwell chose PALS because of its stated ability to increase reading levels two to three grades in 75-100 hours. Our goal was to utilize PALS to teach large numbers of adults who read below the 5th grade level.

The first part of the report describes the implementation of the PALS program. Every effort was made to maintain a strict adherence to PALS as outlined by IBM to enable us to sufficiently evaluate the system. The report describes our results, how they differ from the IBM model, and where the system's strengths and weaknesses lie. It explains the programs limitations in detail and in the final analysis refers to PALS as part of a reading program which must be supplemented. It suggest reasons for not meeting goals as inferred by IBM and ends by laying out what Bidwell found to be a workable solution, given the fact that we already possess the system.

The following will find the report useful: Any agency whose mission is to combat illiteracy and its widespread affects, adult education service providers, agencies interested in computer assisted instruction, literacy councils, reading specialists, JTPA, teacher training programs, Reading Supervisors implementing remedial reading programs for high schools, Reading Journals focusing on evaluating adult reading programs, state or federal agencies who are potential users of the program.

A. Introduction

Bidwell Training Center Inc., was founded in 1968 as a non-profit vocational training center located on the Northside of Pittsburgh, Pennsylvania. From the beginning, Bidwell offered GED and academic remedial instruction for students enrolled in the vocational courses. Though Bidwell had trained and placed thousands of students who completed training, we found an increasing number of applicants ineligible for training because of low reading skills. Approximately 20% of the city and county Job Training Partnership Act (JTPA) referrals who were supposed to be academically eligible were rejected for this reason. An even larger number of applicants never reached our screening process because of scores far below the 6th grade level. With few agencies addressing the needs of the illiterate community in 1987, Bidwell initiated a program to combat the increasing rate of illiteracy in the Pittsburgh area. Our objective was to address the large numbers of individuals unable to read by enrolling 64 students per cycle, three 15 week cycles per year, for a total of 192 students.

Bidwell chose to implement three distinct types of literacy programs. The Principle of the Alphabet Literacy System (PALS) was chosen to reach larger numbers of people on an individualized basis than the more traditional one-on-one tutoring approach. We also began a classroom reading laboratory and a combination program which combined PALS and reading lab.

B. Statement of the Problem

As a 310 project, Bidwell undertook to implement and evaluate IBM's Principle of the Alphabet Literacy System and its effectiveness. We also

compared the results of students' pre and post test scores from all the programs to determine if one method proved more effective than another. We attempted to maintain a strict adherence to PALS as outlined by IBM with the exception of two areas. 1. We conducted 15 week cycles rather than the recommended 20 week cycles. 2. The PALS lab can accommodate 16 students per hour beginning at the same time. We however ran an open-entry-exit program, enrolling new students on a weekly basis throughout the cycle. This was necessary because of recruiting circumstances and our determination to address the needs of our population on a continual basis. IBM had intended all 16 students to begin at the same. Students were to achieve two to three grade levels increases in 75 to 100 hours of lab time. They were scheduled for one or two 60 minute periods in the PALS lab daily and an additional one hour of math. A staff of two part-time directors, two instructors, and a counselor/recruiter implemented the entire PALS program.

The following report is a description of the Bidwell PALS implementation, an evaluation of its strengths and weaknesses, recommendations, and a comparison of the various program test results.

C. Goals and Objectives to Attack the Problem

In order to adequately evaluate PALS, every attempt was made to implement and run the system according to IBM specifications. We sought advice from IBM on a continual basis in order to adhere to their program.

Local IBM staff conducted a three day on site training session for our entire PALS staff. We were given teachers' manuals and hotline numbers for programmatic questions and equipment failures. IBM was always responsive to inquires and even put us in contact with other PALS' users across the country who could address our inquires from a first hand experience. After contacting some of the users, we felt more confident about the results we

were seeing, having set up the lab according to IBM specifications. Upon our request, Dr. Virginia Nelms, PALS consultant, and a national and local IBM representative met with our staff midway through the year. The purpose of the meeting was to review our programs implementation, to discuss whether our preliminary findings were reflective of other programs, and to make recommendations for improvement.

In order to recall the events of PALS implementation, staff was asked to keep a journal of significant happenings and observations throughout the initial year. These journals were to document all parts of the program and to express any strengths, weaknesses, or questions we encountered.

D. Procedures Employed to Attack the Problem

PALS is an interactive reading instruction program developed by Dr. John Henry Martin and the IBM Corporation for adolescents and adults reading below the sixth grade level. Bidwell's PALS laboratory was equipped to enroll sixteen students per class and was set up according to IBM's specifications.

1. Classroom and Equipment

The computer lab which cost approximately $50,000 is sectioned into three major workstations. Four INfo-window stations include IBM's INfo-window monitor, touch sensitive screen, and video/disc player connected to an IBM Personal System 2 computer. The Principle of the Alphabet Literacy System Program is on double sided instructional video/disc. Eight students work in pairs. Noise is regulated by use of headphones. Each student also uses a Student Work Journal for record keeping and practice in phonemics during Phase 2 of the course.

Eight word processing stations consist of IBM PC jrs., color monitors, and IBM Prowriter II's. Primary Editor, also an IBM product, is used as the

word processing software. Type It, a linguistically oriented typing book, is used for touch typing.

We also purchased four Action-Writer typewriters and four tape recorders for the writing phase of the program.

Two medium sized round tables, chairs, file cabinets and carrels for workstations were purchased as specified by IBM. (see chart 1)

2. Student Selection

Our basic philosophy was to screen students in rather than out. Anyone over 17 years of age could attend a weekly orientation on Friday morning with the opportunity to begin classes the following Monday.

We found open-enrollment necessary primarily because 16 students per class were never available at the beginning of a cycle. Despite extensive recruitment efforts on the part of our staff and referrals from city and county JTPA and numerous literacy and community agencies, applicants filtered in slowly, but continuously during each 15 week cycle.

Two tests were initially administered to applicants. The Gates-MacGinitie, a standardized test, was given to determine the students' grade level in reading. This same test, with different forms was given at the completion of the cycle to determine approximate gain in reading. A PALS functional literacy test was administered but discontinued because the students were test shy when applying. In addition, the testing session was too long, the PALS test was not providing us with any additional pertinent information and there was only one form of the test.

Students were not screened for IQ nor learning disabilities. What we found consistent, however, was that many had been in special education programs. Because of the nature of our program and the clientele we serve,

we were reluctant to limit our program to the group recommended by IBM. Following is IBM's position on student selection.

- An IQ rating of 75 or above
- A standardized reading score at or below a fifth grade level
- An inability to write a simple sentence
- A lack of hearing or vision impairments, brain damage, or other diagnosed physical handicaps that interfere with learning.

3. The Program

a. Phase One

Phase One of the program was conducted at the INfo-window stations 30 minutes per day. Students listened to a cartoon presentation on the invention of the alphabet while working in pairs. The "teacher-manager" assess their comprehension by questioning students on the story content. The point of the story was to develop a phonemic response and rationale for the letters of the alphabet. Questions concerning story elements such as character, plot and predicting outcome were suggested by IBM. Students were to repeat a disc if they unable to answer these questions. However, specific story line questions were not given by IBM. This evaluation of comprehension mastery was a "teacher-manager" decision.

The story took place in ancient times. The main characters were stereotypes of good, bad, smart, and strong people. The story took about 25 reviewing hours to complete.

Get Set, with syllables, part of IBM's Write to Read program for primary students, was suggested if students didn't know the names of the alphabet. It provided needed remediation.

b. Word processing/Touch Typing Station

Primary Editor was an extremely simple word processing program. Editing allowed insertions and deletions but not reorganization in spacing. The Type It book is a linguistically oriented typing manual.

> It aims to strengthen fine motor co-ordination, finger muscle strength and tone, eye-hand coordination, visual discrimination and visual memory. (Joan Duffy, 1974 Type It, preface.)

The belief is that touch typing will reinforce the students' phonemic understanding both visually and kinesthetically. The typing system will also bolster the students' self image. The word processing station allows the student to make a hard copy. This is both satisfying to the student and gives them something to study away from the classroom. The Type It program goes on throughout Phase I and 2.

c. Phase 2

Phase 2 is about five to six weeks in duration. The students should have successfully finished the Invention of the Alphabet story and taken a spelling test. The spelling words for this test are in the teaching manual. The level of mastery that should be acquired was not noted in the manual. No remediation other than return to Phase 1 was recommended.

Phase 2 is also done in pairs. Each student is issued a 112 page work journal. One student types answers asked by the PALS program, while the other writes in the Work Journal. The program will patiently correct incorrect responses entered by the student. There is a complete routine by which the student may be guided to the correct answer. This routine included visual and auditory signals as to where and what the incorrect answers were. It demonstrated how to voice a sound and give a clear enunciation of the sound. The students used these aids willingly whenever needed. The program always gave the correct answer as the final aid in the correction routine. The "teacher-manager" was to monitor problems answered by the computer. If the workbook was completed, and the "teacher-manager" felt the student needed more work, IBM suggested to re-do the work journal.

d. Phase 3

Phase 3 changed the instructional style to language experience. The students dictated a "Bio-sketch" into tape recorder. The teacher - manager helped the student by using an interviewing technique. The students used a word processing station or typewriter station to transcribe their bio-sketch. They were to use phonemic spelling, and to work as partners, so they help each other with ideas and revisions. The "teacher-manager" was not to correct syntax or spelling, except, by drawing out a phonemic sound or linguistic principle.

4. Teacher Manager

PALS is intended to be a complete program run by a "teacher-manager". As described by the Teacher's Manual, this person,

> Is elevated to that of a trained manager, observer and a diagnostician. . . . whose time will be spent monitoring students' progress. . . . This new role is similar to the status accorded to other professions . . . which use technology to elevate the professionalism and decision-making capacities of the practitioners. (Dr. John Henry Martin, 1987. IBM Info Course; Principle of the Alphabet Literacy System, Teacher's Manual, p. 4-2)

IBM strongly recommended that we not place a reading specialist in the lab. They apparently felt a specialist would be too judgmental and critical of the system. The "teacher-manager" we hired , though experienced in literacy education, lacked the necessary diagnostic skills of a reading specialist. We were forced to seek guidance from our resident reading specialist on a regular basis because of questions and problems which needed to be addressed by a trained specialist. The "teacher-manager" was the overseer but not the innovator. No other materials were to be used in the program.

E. Statistical Data

For statistical analysis we grouped the PALS participants according to the grade level achieved on their entry reading test. We initially ran three groups; 0-2, 2-4, and 5-8. Within weeks we dropped the 5-8 reading group from PALS when it became evident that program was inappropriate. IBM had used the 5th grade level as a cut off point for PALS but we were experimenting to see if it could be effective for this group. Some students in (Group A the non-reading group 0-2) did not know names for the entire alphabet and few knew the sounds of consonants. Group A showed little measurable growth on the Gates McGinitie test upon completion of the PALS program. The average growth rate was .3 of a grade level. Participants in Group B, 2-4 grade level, faired much better as their growth range was from .7 to 2.8. The average academic growth for Group B was slightly over 1.7.

A third group, Group C received a combination of PALS and traditional classroom laboratory instruction. Group C, 2-4 grade level, had a growth range between .6 to 5.0. However, the average for this group was also about 1.7. We found that a third of the 0-2 grade level in Group C made very little progress in PALS and where classroom laboratory intervention was used in successive cycles their scores did not show any significant improvement. IBM directives would have screened out these individuals. As mentioned previously, Bidwell does not screen out any students by IQ, learning disabilities, physical, mental, or other handicaps suggested by the IBM PALS original format.

Two thirds of the 0-2 participants in Group C, however, did show some growth once they received classroom instruction. For these students, PALS provided a solid foundation in which they were able to build on in future program cycles. We can infer from this, that measurable growth can be realized in low readers who do not have prohibitive, physical, or special

learning problems. However, the growth for this group is low (between 0.1 to 1.0 growth). Participants in the 2-4 initial entry reading level faired much better and their growth average was 1.7. In fact, we can conclude that PALS seems to be most effective in this range (2-4). Classroom instruction and/or PALS for students in this range produce results that are strikingly similar. This infers that either mode of instruction is suitable and really depends on individual preference of the adult learner. PALS, however, does have the enthusiasm factor because its modern technological and learning format is very attractive to many adults. In fact, PALS students in Group A and B tend to return for future literacy training, even if the training does not include computers. Students in the 3-5 entry level tended to use PALS as a confidence builder. They also used it to increase their reading speed which in turn helped them to progress in other classes throughout the year.

F. PALS Strengths

We found strengths of PALS to be classroom organization and program elements. The classroom itself, with its obviously new, expensive and high tech equipment contributes not only to raising the self-esteem of the students but also to motivating them. It is also a sign that this educational institution is different from the others that many of them had attended in the past. At Bidwell, they are getting the best and the most expensive, not the worst and the oldest.

The INfo-window was always positive. It never gave the student negative feedback. This was an excellent feature because many of our students have had such negative learning experiences in the past. The INfo-window was touch sensitive and gave the students auditory responses indicating the correct place to touch the screen. When working on PC jrs., students received a print out of their work. They enjoyed this aspect of the program

because their mistakes could be corrected on the screen, enabling them to have an error free copy. PALS proved to be particularly beneficial to those students reading at the 4-6 grade level. They were able to go through the program quickly which helped to solidify the reading skills that they brought into the program. It gave them the confidence to try new things. In this way, PALS was used in a remedial capacity. Students gained a comfort level with high tech equipment which contributed to their rising self-esteem and reduced inhibitions to learning. For some the story was interesting. They especially liked the adventure of thwarting the evil plans of Duke Hamen.

The students liked the work Work Journal segment best of all PALS phases. They enjoyed having a workbook to write in while interacting with the computer. The Work Journal was an excellent self-paced workbook experience. The program included prompts so that the student could always answer questions.

PALS presented an excellent phonemics approach to reading. It included auditory and visual components with exceptional timing. Phonics were inductively presented through word families. The mixture of a phonemics and linguistic approach to language experience was appropriate. The method in which the Invention of the Alphabet was presented interested students. The sound, shape, and name of letter were distinguished clearly. The sound to letter correlation was adequate with most phonemics.

The Typing aspect of the program also improved students' self-image. Students enjoyed learning how to type and developing some familiarity with computers and a word processing program. Reading skills like blending were reinforced while typing. Teaching word families and typing letter sounds simultaneously was a clever method of presenting a kinetic approach to learning to read. This method was particularly helpful to students with

learning disabilities such as dyslexia and short term memory loss. The Type It book was excellent. And well organized from a linguistic point of view. The exercises did help to expand the students' vocabulary, spelling, and reading skills.

Although the initial expense of lazer technology needed to implement PALS was of concern, the technology is wide open and is being used on an increasing basis to instruct specific skill areas interactively. We feel IBM was on the right track and that program instruction in other reading skills will be forthcoming. Bidwell is confident that a good investment has been made and that large number of adult learners will benefit from it.

G. PALS Weaknesses

The majority of PALS Weaknesses were programmatic with the exception of clientele. PALS only accepted a narrow range of students. These restrictions could have created difficulties had we adhered to them. Our mission is to work with as many people as possible, and not restrict our program in any way.

Low level readers, that is students who do not know the names of letters let alone sounds, have difficulty with PALS. It is acknowledge that these students may have learning disabilities. Nonetheless, Bidwell students who have not known the names of letters have failed to benefit from the program.

The PALS program had no formal assessment tool. It recommended using a questioning technique to assess student understanding of the story and a short spelling test to assess phonemic skills. The teacher's Manual recommended repeating the previous disk or a complete phase if the student appeared not to have mastered the skills. The manual was lacking in specifying the level of mastery to be acquired or any remediation other than repetition.

IBM provided the Write to Read and Get Set software but this program did not address all of the skills that were not mastered. Although the structure and organization were compatible with PALS, the content, the words, were not.

Although some enjoyed the story, most did not. It was interesting but at times needed to be sold to the students as it progressed, probably because it was long and the plot was superficial even to a non-reader. This kind of cartoon story may have had a negative connotation because it was reminiscent of their childhood television experiences. The story had an unfamiliar setting and some did not like the cartoon format. It discouraged students who wanted more interaction with the computer right away. There were students who felt the story, with its simplistic plot line and stereotypical characteristics, was degrading. "After all, I can't read but I do watch Miami Vice." The representation of a single character trait within one recognizable cultural group was obvious in the story. Bidwell avoids attributing single characteristics to any one racial or ethnic group.

Phase 2, the Work Journal, was an exciting benchmark for our students. They were ready to try their reading and phonemic skills. The computer introduction, however, did not give enough instructions to allow the students to jump right in. Disc 7, the introduction to the Work Journal, belabored the slowing down of speech in order to hear the sounds but failed to remind the student they would have to capitalize the first letter in order to attain the correct response. The "teacher-manager" was required to remain with the pair and talk them through this Disc.

The training and the Teacher's Manual were inadequate for the Bio-Sketch aspect of the program. The open-endedness of the Bio-Sketch left the student and the teacher without any objective criteria. The language expression allowed transfer in phonemic skills but did little for growth in reading

ability. This part of the program demanded a one-on-one teacher/student relationship, sometimes for an extended period of time leaving the other members of the class unattended. Most of the time we had less than 12 students in the lab. Had we enrolled 16 per class, the situation would have been impossible and would have demanded that there be more than one "teacher-manager".

The pairing strategy was difficult to maintain. Open enrollment created some of the difficulty, but the problem was aggravated by poor attendance. Our absentee rate was about 35% which is within the normal range for literacy programs. The cause of poor attendance is greater than poor motivation. Appointments, monetary problems, and home situations, accounted for the highest percentage of excuses. When a partner was missing for a few days the program continued hesitantly, but extended absence of one of the pair completely disrupted the progress of both participants. Further, the pair was quite supportive of one another, but they often lacked the skill to correct or enhance one another learning.

There was little opportunity for the student to actually practice reading. The supplemental books recommended were either not appropriate in subject matter or too difficult to read. The reading specialist ran a reading ability test on several of the books and found them above a 5.0 grade level.

The PALS functional literacy test asks students to read grocery labels and parts of the local newspaper such as sports and human interest stories, want ads and editorials. It also includes part of an employment application form. The directions for taking the test are orally given by the teacher. The test is 30 minutes long with a mandatory 15 minutes required to work on

the test no matter how easy or difficult it may be for the individual student.

Bidwell used the test sparingly because we needed a standardized test for statistical reporting purposes. Students reading between a 0-4th grade level tend to be test shy. Many could only do a few pages on the PALS test. Since the test had but one form, students could complete more of the post test without actually achieving real progress. The PALS test merely suggest an individual's functional reading ability. It does not assess reading skills nor suggest instructional approaches. A functional reading test evaluates knowledge of sight words and the level of compensation the adult learner has attained on their own. Since the test was silent, no information could be analyzed by the teacher or reading specialist and the number correct provided no level of reading. We had many more tools like the Gates MacGinitie which could give more information and show increased ability in smaller steps.

The idea of writing from a taped interview has many positive merits. However, we found our students reluctant to discuss their personal lives. We also stumbled through some very sensitive situations because the "teacher-manager" made some basic assumptions about the students' lives which were untrue. The "teacher-manager" needed to be especially sensitive and gentle. But the most significant weakness with the Bio-Sketch phase was that the technique of writing from language experience doesn't account for developmental writing skills. Many of our students were not ready to write in a narrative form. Several pre-writing activities would have benefitted the student more. The "teacher-manager" started with writing recipes, notes, memos, and word lists, even though this was not directed in the Teacher's Manual.

H. Student Evaluation of PALS

On the whole, Bidwell students who participated in the PALS program were enthusiastic and liked it. They particularly enjoyed writing in the Work Journal and using the word processing program with the Type It Book. However, they found the first phase, listening to The Invention of the Alphabet, the least interesting. In addition, some students refused to use the tape recorders, because to them it was too difficult or they felt embarrassed about having their voices taped. Our students were often reluctant to discuss their lives in a taping/interviewing situation. For those students who used the tape recorder, it was cumbersome, sometimes frustrating, and always time consuming. The students enjoyed the independence of working on the computer but were frustrated that they didn't know "how to read" at the end of the program.

I. RECOMMENDATIONS FOR IBM

Throughout the year, the strengths of PALS made itself obvious; however, Bidwell does have some specific recommendations to IBM for program changes.

1. To shorten the story of The Invention of the Alphabet and to make it interactive.

2. To make the plot more relevant and interesting to adults.

3. To provide an introduction to the Work Journal that reminds them more than once to listen first and then write.

4. To direct students by voice command to look at the INfo-window screen cursor and the prompt when needing help with entering responses..

5. To eliminate the use of the shift and to have the letter come up either as a lower or upper case whichever is correct.

6. To delete page 21 of disc 9 of the Work Journal because it is too open-ended and will accept anything. This exercise is frustrating even for good students.

7. To expand the staff training and the Teacher's Manual especially for the Bio-Sketch Phase of the program.

8. To expand the activities of the Phase.

9. To include a new list of books on which to practice.

10. To improve the letter sound to the word example correlation, particularly o=orange, i=fist, er=Ester, and c=crow.

J. Summary and Conclusions

PALS can be an effective tool in teaching adults to read and write. It is, however, part of a program which must be supplemented for maximum benefit. Following is Bidwell's plan of action to utilize but enhance PALS in year two. In our revised Literacy Program, we will incorporate PALS into a holistic instructional approach using phonemics, linguistics, language expression, structural analysis and multi-level comprehension techniques. We will adapt the instructional approach to the most suitable learning mode and reading need for each individual student. We recognize the power and importance of a strong phonemic base. Reading students can gain decoding fluency, spelling accuracy, and writing confidence. We will pair phonemic instruction with the linguistic approach brought out by the PALS Type It typing book to introduce beginning structural thinking of words and sentences. Many of our students have a large sight vocabulary and read with these cumbersome mental word lists. These students benefit from the PALS program in its entirety. We have other students who are laboriously slow readers. Using the Invention of the Alphabet phase of the program as a tachometer quickens their eye movement and reenforces the idea that

comprehension can come without decoding and/or internally pronouncing every word. The TYPE IT book will be used to instruct in the linguistic mode using a new kinetic tool. This aids in reducing reversals, discriminating between letters perceived identically, and maintaining left to write movement.

Some of our students will practice with the Work Journal phase of PALS after studying the PALS phonemic chart. This PALS phase uses all modes of learning and has provided excellent progress in sound to symbol identification. Students on a 0-4 grade level of reading will use workbook materials from New Readers Press and Steck-Vaughn. This provides sequence and structure to other areas of reading development not present in PALS like comprehension, and analysis of language structure.

All our students, even those preparing for their GED, will use the computer laboratory and the PALS word processing phase to improve their writing skills. The Language Experience approach of PALS can provide a non-threatening atmosphere in which our students can master writing skills and strengthen their own self-esteem.

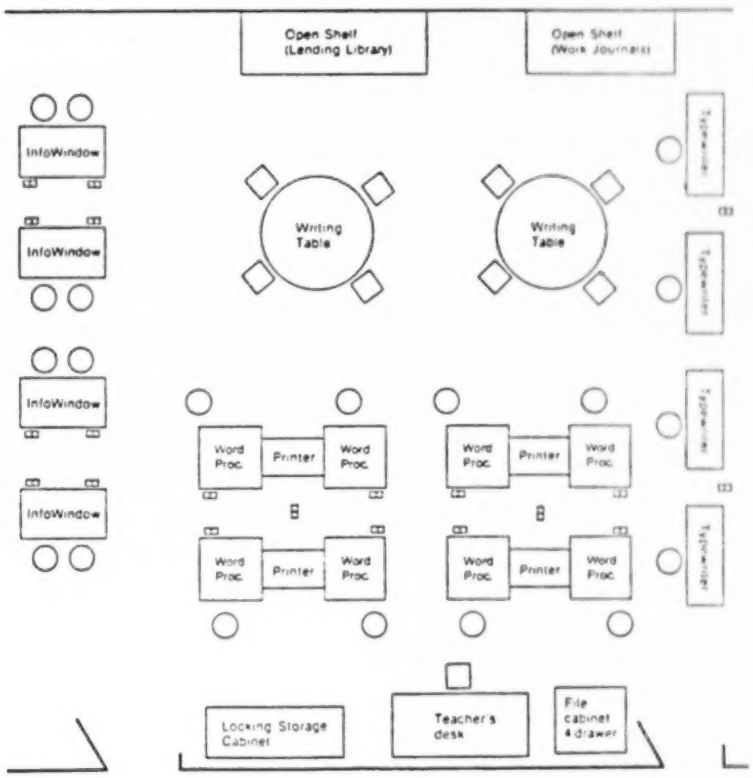
In addition, individuals who lack reading skills also tend to have other enormous social barriers and problems to overcome. We find it necessary to have a counselor on staff who can respond to students' needs and assist them in resolving any type of problem which inhibits them from attending and participating in class regularly. Common problems range from welfare, housing, and baby-sitting, to transportation, medical, and legal problems. It is also of the utmost necessity to have a reading specialist in the PALS lab who can diagnose problematic situations which might affect any students' ability to learn or improve reading. PALS will work at Bidwell, given flexibility, creativity, and highly-qualified staff.

K. Distribution of Report

In addition to the Department of Education, this report will be distributed to IBM Corporation, literacy providers and organizations in the Pittsburgh area, and colleges and agencies represented at the Literacy and Technology Workshop who requested copies of the report. Additional copies can be obtained upon request from ADVANCE or Bidwell Training Center Inc.

Classroom layout

A sample, fully configured classroom would be laid out in at least a 20' x 30' room, in the following way:



□ = standard chairs
◯ = secretarial chairs on rollers
⊟ = duplex outlet

Notes:

1. Position InfoWindow systems so as to insure maximum privacy for students and to minimize distractions from the rest of the classroom.
2. Standard outlet: 1 quad or 4plex or 2 duplex outlets, 3-prong plug, standard AC 15 AMP outlet, 120 V, AC, 1 phase, 3-wire, 60 Hz
3. Temperature: 60° to 90° F
4. Humidity: 8% to 80% RH

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